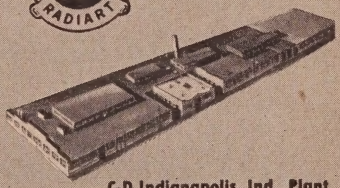
the CORNELL-DUBILIER CD Capacitor

The Radiart Corp.
Cleveland, Ohio, Plants

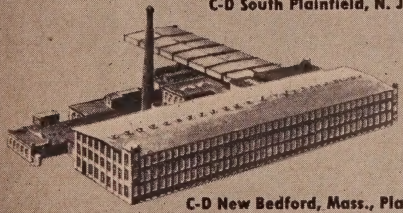
C-D Fuquay Springs Division, N. C.



C-D Indianapolis, Ind., Plant

C-D Providence, R. I., Plant

C-D South Plainfield, N. J., Plant



C-D New Bedford, Mass., Plant

C-D Worcester, Mass., Plant

C-D Cambridge, Mass., Plant

Vol. 19 INDEX JANUARY, 1954 ISSUE No. 1

CORNELL-DUBILIER ELECTRIC CORP.
Boulevard, South Plainfield, N. J.

Sec. 34.66 P.L.&R.
U. S. POSTAGE
PAID
So. Plainfield, N. J.

MR JOHN J GERIG W6NHU
110 SIMS AVE
VALLEJO CALIF

INDEX TO ARTICLES

appearing in the

1953 Issues

of the C-D Capacitor

"Television Interference (TVI) Filters" ..... January

"A High-Selectivity Pass-Reject Amplifier" ..... February

"Technique of Wave Analysis" ..... March

"A Practical Hum Stethoscope For Amplifier Troubleshooting" ..... April

"Inductance Data For Experimenters" ..... May

"Simplified Audio-Frequency Microvolter" ..... June

"Rapid Checkout Methods in TV Servicing" ..... July

"Modern V. T. Voltmeters" ..... August

"Modern Oscilloscope Accessories" ..... September

"An Improved 150-Watt Phone-C.W. Supermodulated Transmitter" ..... October

"Miniature Components For Transistor Circuitry" ..... November

"Simple Signal Injectors" ..... December

To You . . . whom we think of as a friend and for whose pleasure and profit "The Capacitor" is dedicated, we sincerely wish a **New Year** of continued happiness and prosperity.

Cornell-Dubilier Electric Corporation

SUBSTITUTION UNITS FOR TROUBLESHOOTING

The quick substitution of a good component for a defective or missing one in a circuit is one of the oldest troubleshooting aids. What service technician has not at some time temporarily bridged an open capacitor with one known to be in sound shape? Or swapped tubes?

While many technicians use substitution techniques profitably in radio, TV, and electronic troubleshooting, a few operators believe built-up substitution units to be of greater value in the workbench development of new circuits than in the servicing of old ones. A poll of experienced troubleshooters, however, is apt to reveal a high regard for such units. Substitution boxes are not known to be dust-catchers.

Substitution units are not instruments, but accessories. In usefulness, however, they often rank with instruments when used intelligently to isolate circuit troubles. The substitution process momentarily restores a circuit to normal operation, thus pinpointing a defective or missing component. Substitution units usually are inexpensive by comparison with other servicing aids.

It is convenient to group substitution units into passive and active categories. Passive units include the familiar resistance, capacitance, and inductance boxes. Active units include dynamic substitution channels such as oscillators, r. f., i. f., video and audio amplifier stages; video and sound detectors; replacement loudspeakers; d. c. power supplies; etc.

It is enlightening to some technicians to consider seriously for the first time the number of substitution devices which are available, or can be made so, for troubleshooting. This article describes the general configuration and

CORRECTION

An omission has been noted in the Circuit Diagram of the 150 Watt Supermodulated Transmitter shown on Page 7 (Fig. 3) of the October 1953 issue of "The Capacitor."

A connection should be shown between the junction of capacitors C_{15} and C_{16} and the Grid of the 807W (PM) tube.

circuit details of some units. From the descriptions given, satisfactory substitution units for radio, TV, and electronic use can be built.

Resistance Substitution Units

The substitution resistor perhaps is the best known of all such units. Some makeshift form of this substitution device is used repeatedly by service technicians who do not own completely assembled units. As is true of other substitution units, the versatility of resistance substitution jobs is increased by the various forms which this device can take. Several are described in the following paragraphs.

Decade - Type Resistance Units. The step-type decade variable resistor is well known from its long history as the decade resistance box of the laboratory. While substitution versions of the decade box are similar in action, they do not need the extreme accuracy of the laboratory instrument.

In the decade, it is common to employ ten resistors of equal value and to connect them with a rotary switch so that equal-resistance steps may be selected between the value of one resistor and of all ten in series. Several such decades then may be connected in series to provide a wide resistance range in small steps.

In the interest of economy, we can use only 5 resistors in each decade if a 2-pole rotary switch is employed. This is especially attractive when

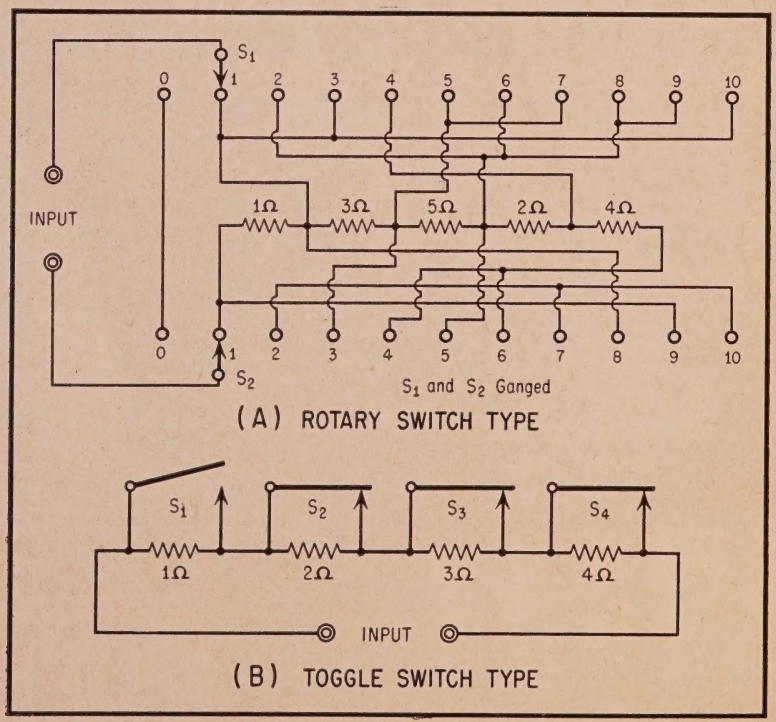


Fig. 1. Decade-Type Resistance Substitution Boxes.

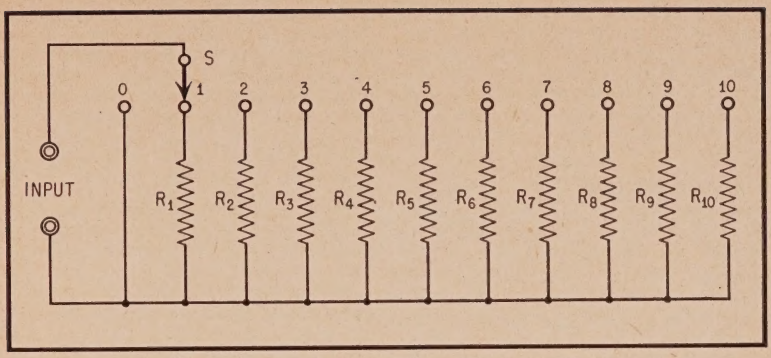


Fig. 2. Random-Resistance-Type Substitution Box.

expensive resistors are used. Figure 1(A) shows such a circuit. In positions 1 to 5 of the ganged 2-pole switch, S_1 - S_2, the individual values of the 1, 2, 3, 4, and 5 ohm resistors are selected. Beyond 5 ohms, various combinations are switched in series. For example: 6=4+2, 7=5+2, 8=5+3, 9=5+3+1, and 10=5+2+3. At the zero setting of the switch, the INPUT terminals are short-circuited internally, approximating zero ohms.

One to 5-ohm resistors are shown in Figure 1(A). This provides 1-ohm steps between 0 and 10 ohms. 10, 20, 30, 40, and 50 ohm resistors would be required for a decade giving 10-ohm steps between 0 and 100 ohms; 100, 200, 300, 400, and 500 ohm resistors will give 100 ohm steps from 0 to 100 ohms; etc.

A toggle-switch scheme may be employed for the resistor switching and will permit a complete decade with only four resistors. This arrangement is shown in Figure 1(B). Switches S_1 to S_4 are normally closed. When all are closed, all resistors are short-circuited and the box resistance is zero ohms. Opening a switch cuts its associated resistor into the circuit. The circuit resistance thus is indicated by the total resistance shown by open switches. Thus, when S_2 and S_4 are opened, we have 6 ohms.

This arrangement provides ten steps each equal to the lowest resistance. The 1, 2, 3, and 4 ohm resistors shown in Figure 1(B) provide 1-ohm steps between 0 and 10 ohms; 10, 20, 30, and 40 ohm resistors would be used for 10 ohm steps between 0 and 100 ohms; etc.

The switch scheme is used often with high-wattage resistors in decades intended for power supply bleeder substitutions and similar applications. This has an advantage over the rotary switch arrangement of Figure 1(A), since the contacts of most small, compact, rotary switches will not handle high power levels.

For ordinary applications, 1-watt resistors will be adequate for use in decade-type substitution boxes. Either composition or wirewound components can be used.

Random-Type Resistance Units. The uniform steps of the decade-type resistor are not always a requisite in substitution practice. In common radio and television work, a switched set of standard RTMA values often is favored, while conventional decades are more useful in servicing instruments and specialized electronic equipment.

Figure 2 shows the circuit for a random-type resistance substitution box. Ten selected resistors are shown

with a common 11-position rotary switch. The eleventh position provides the zero ohms setting. Rotary switches having more than eleven contacts are obtainable, although perhaps not as readily as the 11-position type, and will allow more resistors per section.

A spot-resistance scheme of this sort naturally requires a studious picking of resistor values. It is necessary to include as many as possible of the common values. For assured full coverage under a variety of anticipated conditions, at least four units like the one in Figure 2 will be needed. Suggested values for one switching section are 1K, 1.5K, 2.2K, 2.7K, 3.3K, 3.9K, 4.7K, 5.6K, 6.8K, and 10K. Divide these values by 10 for a second switching section, and multiply them by 10 and 100 for third and fourth sections.

Potentiometer-Type. Rheostat or potentiometer substituition such as is required in the temporary replacement of gain and level controls, calibration adjusters, tone controls, etc., require continuously variable adjustment of resistance. The step-type variation provided by the switched resistors just described is not fine enough.

Several potentiometers mounted in small boxes, with three binding post terminals to provide both rheostat- and potentiometer-type connections, make excellent continuously-variable substitution resistors (See Figure 3A). A good variety of resistances and tapers should be chosen. The dial of each unit can be calibrated roughly in ohms with the aid of an ohmmeter.

Ordinary single-turn composition and wirewound volume controls are entirely adequate for troubleshooting,

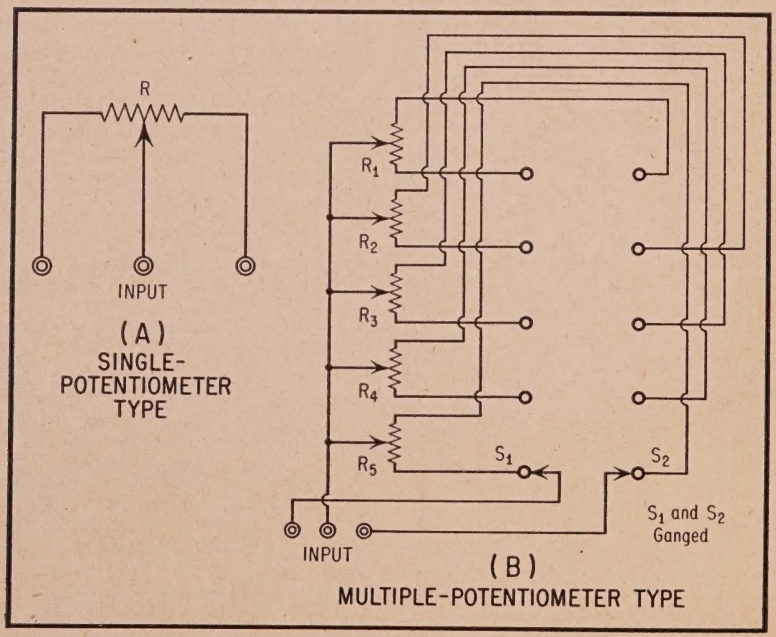


Fig. 3. Potentiometer-Type Resistance Substitution Boxes.

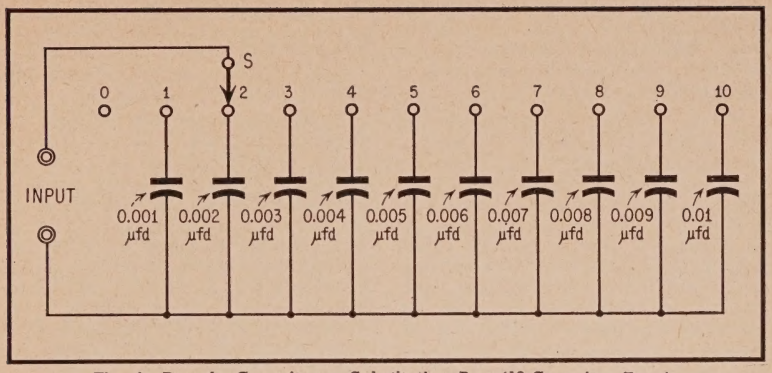


Fig. 4. Decade Capacitance Substitution Box (10-Capacitor Type).

although the more costly multiturn, helical-type potentiometer is favored for painstaking developmental work in the laboratory. The labelling of the mounted substitution potentiometer should indicate the taper number and whether the unit is composition or wirewound.

Power-type rheostats may be employed for heavy-duty applications. Such uses include substitution of power supply bleeder sections, series-filament dropping resistors, current-regulating resistors, and power supply filter resistors. Adequate ventilating holes must be provided in the mounting cases for power rheostats.

For maximum flexibility and compactness, a number of selected potentiometers can be mounted in a single box with a selector switch. Figure 3(B) shows this arrangement. The potentiometer arms are wired together and to the center INPUT binding post. Each winding is connected to a pair of opposite switch terminals. This scheme is not recommended for use with power-type potentiometers unless the switch contacts are rated to carry the expected high current levels.

Capacitance Substitution Units

Substitution capacitors are similar to substitution resistors but in many respects are the "dual" of the latter. For example; where resistors are switched in series, capacitors must be switched in parallel. However, it is possible to simplify capacitor decades as well as resistance decades.

Decade Substitution Capacitors. Like the resistance decade, a capacitor decade provides equal steps from zero up to a final value equal to 10 times the lowest value. An example is the 10-capacitor unit shown in Figure 4. Here, the lowest capacitance is 0.001 ufd. and each capacitor has a value 0.001 ufd. higher than the preceding one. Thus, the capacitance is varied in 0.001-ufd. steps from 0 to 0.01 microfarad. If the capacitors start at 0.01 ufd. and end with 0.1 ufd., then steps of 0.01 ufd. are provided from 0 to 0.1 ufd. At the 0 setting of the switch, no capacitor is in the circuit and "zero" capacitance is indicated. Actually, there is a small residual capacitance due to internal wiring and external leads.

For complete coverage of a wide practical capacitance range, several 10-step boxes are required. The first capacitors in the various boxes may be 0.0001, 0.001, 0.01, 0.1, and 1 microfarad. It seldom is advisable to go below 0.0001-ufd. steps, since at lower capacitances switch and wiring capacitances introduce considerable error.

In connecting boxes together, the duality principle again comes into play. Resistance boxes are connected in series, but capacitor boxes must be connected in parallel.

When economy does not permit ten separate capacitance values per decade as in Figure 4, four capacitors can be used to provide the ten steps if a 4-pole selector switch is employed. This arrangement is shown in Figure 5. The individual values are switched across the INPUT terminals for 0.001, 0.002, 0.003, and 0.004 ufd. Beyond 0.004 ufd., the switching arrangement places appropriate parallel combinations across the terminals. For example: $0.005 = 0.004+0.001$, $0.006 = 0.004+0.002$, $0.007 = 0.004+0.003$, $0.008 = 0.004+0.003+0.001$, $0.009 = 0.004+0.003+0.002$, and $0.01 = 0.004+0.003+0.002+0.001$. As explained in connection with the 10-capacitor decade (Figure 4), the capacitors can be changed by multiples or submultiples of 10, in order to change the decades. Thus, 0.1, 0.2, 0.3, and 0.4 ufd. can be used in the 4-capacitor decade to provide 0.1-ufd. steps from 0 to 1 microfarad.

A simple 4-capacitor circuit for obtaining 10 steps, decade fashion, utilizes toggle switches and is shown in Figure 6. The switches normally are open ("zero" capacitance). Each closed switch indicates that its associated capacitor is connected to the INPUT terminals. The total capacitance of the box thus is the total capacitance associated with closed switches. For example; when S_1 only is closed, C = 1 ufd., but when S_2 and S_3 both are closed, C = 5 ufd.

The switching circuit of Figure 6 is favored particularly for large-capacitance decades (1 to 100 ufd. and higher), such as used for power supply filter capacitor and motor starter capacitor substitutions, where the normal capacitor currents are apt to exceed

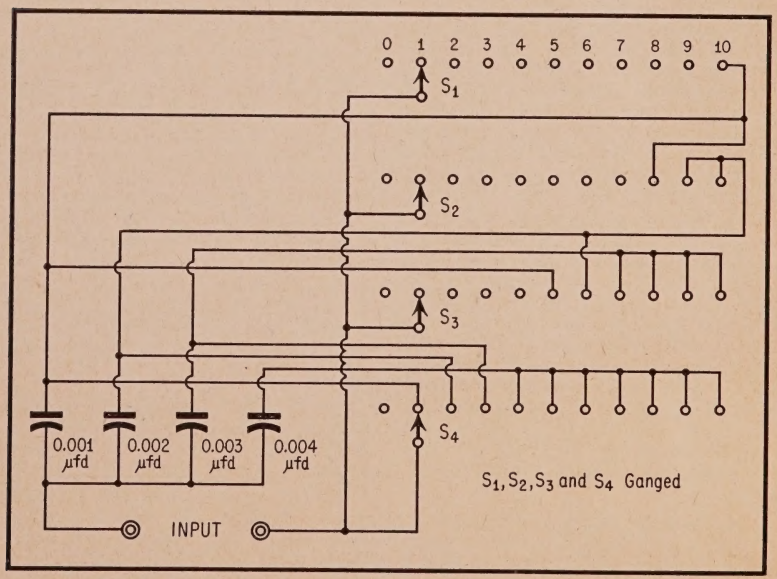


Fig. 5. Decade Capacitance Substitution Box (4-Capacitor Type).

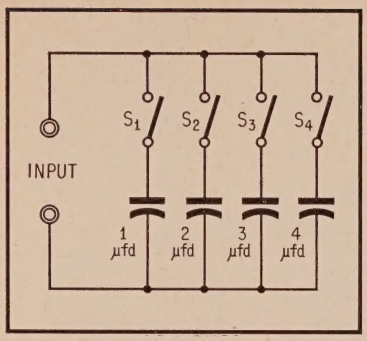


Fig. 6. Decade Capacitance Substitution Box (Switch-Type).

the modest ratings of small rotary switch contacts.

Random Capacitor Units. The equal steps provided by decade substitution capacitors may not be required in individual cases. When this is true, capacitors of the desired value may be selected for the switching circuits shown previously. In this respect, the altered capacitor substitution unit functionally resembles the random resistance substitution box. Practical spot-capacitance values which might be included in a random box are 100, 250, 500, 1000, 2000, and 500 uufd., 0.01, 0.05, 0.1, 0.25, 0.5, 1, 10, 20, and 40 ufd.

Variable Substitution Capacitor. When small changes in capacitance or smooth variations are required, the steps provided by the capacitor-switching substitution boxes just described will be unsatisfactory. Continuous variation is provided by a variable air capacitor which may be mounted solidly into a box, as shown in Figure 7.

The maximum capacitance of this unit may be 350, 365, 400, 500, or 1000 uufd., as desired. The capacitor tuning dial may be calibrated to read directly in micromicrofarads, with the aid of a capacitance bridge, grid-dip oscillator, or Q-meter.

Strays in Capacitance Units. Stray capacitance due to wiring inside the substitution unit, between the terminals, and between connecting leads is significant in the use of all types of capacitor substitution units. There is no comparable difficulty in the use of resistance substitution units, except at resistances of 1 ohm and lower which seldom are employed in trouble-shooting.

With this in mind, we recommend that each capacitor substitution box be checked to determine the amount of residual capacitance present at its zero indication, and that each box be labelled with this figure. For maximum accuracy, this value then must be deducted from any indicated capacitance. When using a capacitor substitution box, especially at capacitances under 0.001 ufd., connecting leads must be kept as short and rigid as possible and spaced as far apart as practicable.

Active Substitution Channels

The dynamic testing of an electronic system is enhanced when a complete operating channel can be patched around a defective channel. With the substitution channel in position, the system is restored to operation, en-

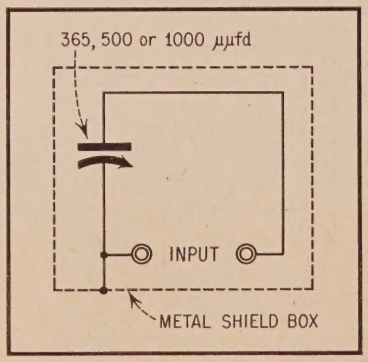


Fig. 7. Variable-Capacitor Substitution Box.

abling other points and subcircuits to be checked.

Such active channels include r. f., i. f., video, and audio amplifiers; AM and FM detectors; limiters, oscillators, discriminators, sync circuits, loudspeakers, filters; and high- and low-voltage d. c. power supplies. Amplifiers should have input and output circuits which will enable them to be patched with a minimum of circuit disturbance around similar disabled channels.

It is, of course, not physically practicable to maintain a suitable substitution channel for each and every channel which might be encountered in apparatus to be serviced. However, a shop can provide channels for systems most often encountered. These channels need not be physical duplicates of the apparatus under test, but they must be **functional** duplicates. For example; a substitute 455-kc. i. f. amplifier is useful with any number of different radio receivers, although its tube lineup, component choice, and fine details of circuitry might not correspond physically to any receiver normally handled. The same is true of a patch-around audio channel.

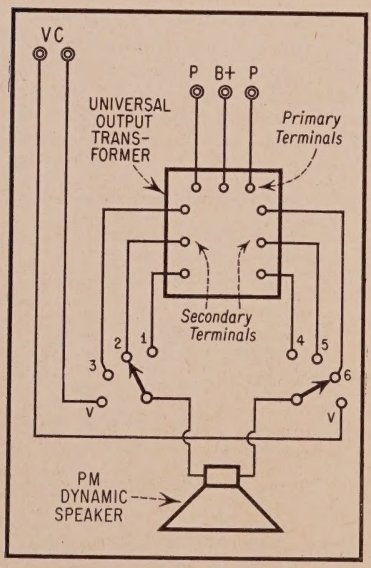


Fig. 8. Substitution Loudspeaker.

For these reasons, we do not show here a variety of possible active substitution channel circuits. Instead, we desire to stress the utility of these units and to encourage their construction and use to suit individual requirements. One radio service technician of our acquaintance obtained a set of general-purpose radio substitution channels by removing the r. f., i. f., detector, oscillator, and audio channels from a discarded receiver and separately powering each. He now is attempting the same for TV. A small self-powered voltage amplifier (adjustable gain up to 100) makes an excellent patch-around substitution unit for audio amplifier troubleshooting. An adjustable-output d. c. power supply with 400-volt, 150-milliampere maximum capacity and with 5-volt 2-ampere and 6.3-volt 5- to 10-ampere a. c. output is a very good general-purpose power unit for patch-in substitutions.

Figure 8 shows a typical circuit for a substitution loudspeaker. A small PM dynamic speaker is used with a universal output transformer and two 2-pole, 4-position rotary selector switches.

The center-tapped primary winding permits connection into either single-ended or pushpull amplifiers, while the 6 terminals of the two switches provide 15 different impedance selections. When the switches are at their V settings, the speaker voice coil is disconnected from the transformer and switched to the VC binding post terminals, whereupon it is available for substitution for a disabled voice coil in the system under test.

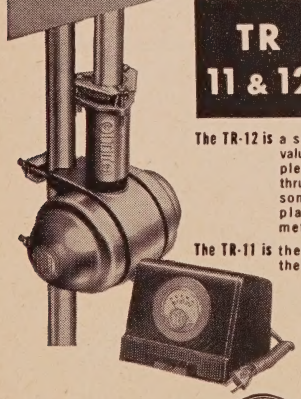
PRE-SOLD for you-

by an extensive consumer campaign in TELEVISION and NEWSPAPER...in KEY ROTOR MARKET AREAS*

the C-D-R Rotor

*coming to your city too!

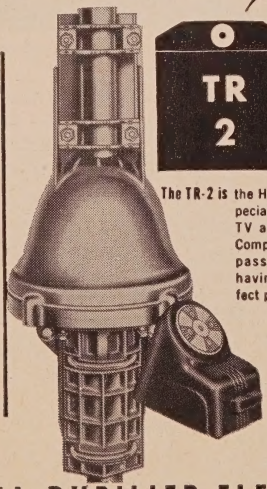
TR 11 & 12



The TR-12 is a special combination value consisting of complete rotor including thrust bearing... handsome modern design plastic cabinet with meter control dial—

The TR-11 is the same unit without the thrust bearing.

TR 2



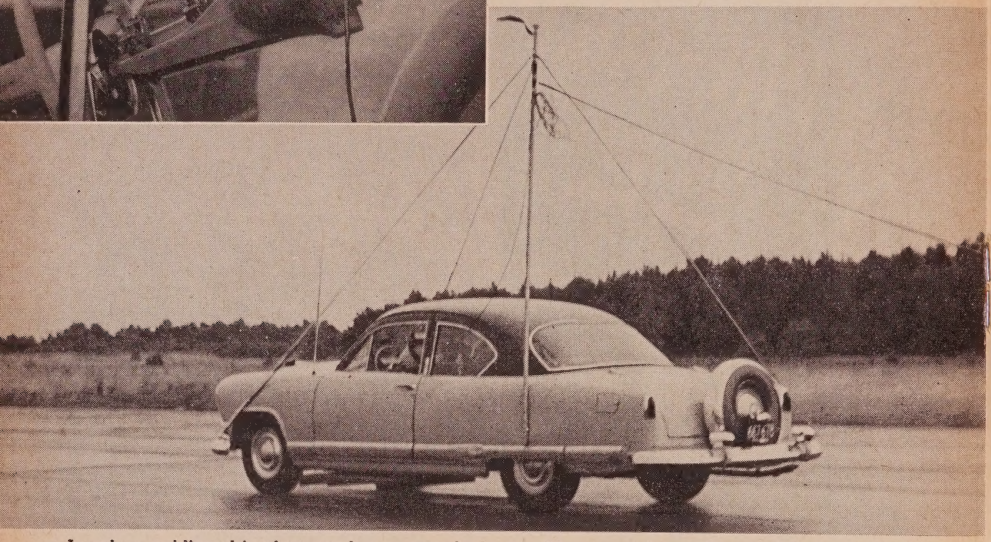
The TR-2 is the HEAVY DUTY rotor especially suited for special TV antenna installations. Complete rotor with "Compass Control" cabinet having illuminated "perfect pattern" dial.

CORNELL-DUBILIER ELEC. CORP.
SOUTH PLAINFIELD, NEW JERSEY

YOUR C-D DISTRIBUTOR WILL BE GLAD TO GIVE YOU A DEMONSTRATION

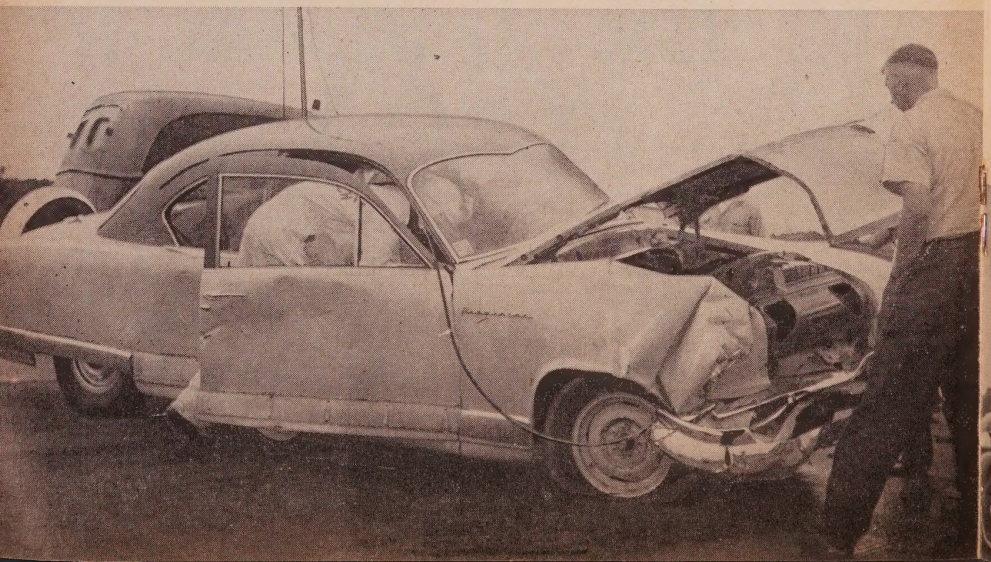
IT'S SAFER TO

*Robot mechanism (CDR TR-2 Rotor) on wheel steered crash car to its doom.



Impulses guiding driverless crash car moved via a cable strung from pilot car 100 feet behind.

This is what your automobile would look like if you hit a parked car while traveling 60 miles per hour.



CRASH LIKE THIS — WITHOUT A DRIVER*

By Richard F. Dempewolff

The other day I rode alone in the back seat of a new car at 60 miles per hour. Nothing remarkable in that — except for one thing: There was no one in the front seat. The car turned, slowed down and speeded up with no one at the wheel. If, as a kid, you ever had the handle of your coaster wagon come off while rolling down a hill, you know how I felt.

My "driver" was a maze of electronic gear, operated by an engineer throwing switches in a pilot car 100 feet distant. A cable, strung from booms on each car, carried the impulses. As the scenery whipped by, I'd hear a grinding noise and see the steering wheel, activated by selsyn motors, slowly turn. A click as a solenoid dropped, and we'd slow down; another click, and away we'd zoom.

The reason for this fantastic remote-control car was not just to give editors eerie rides. This get-up was contrived by Motor Vehicle Research engineer, Len Bell, for the purpose of racing that unmanned car down the runway of an airfield and smashing it to smithereens at 60 miles per hour to see what would happen in a head-on collision. Cans of oil, shoes, a frying pan and other objects were loaded on the ledge behind the rear seat. A weighted human dummy was in the front seat. A well-cushioned movie camera was ready to shoot the catastrophe from the back seat.

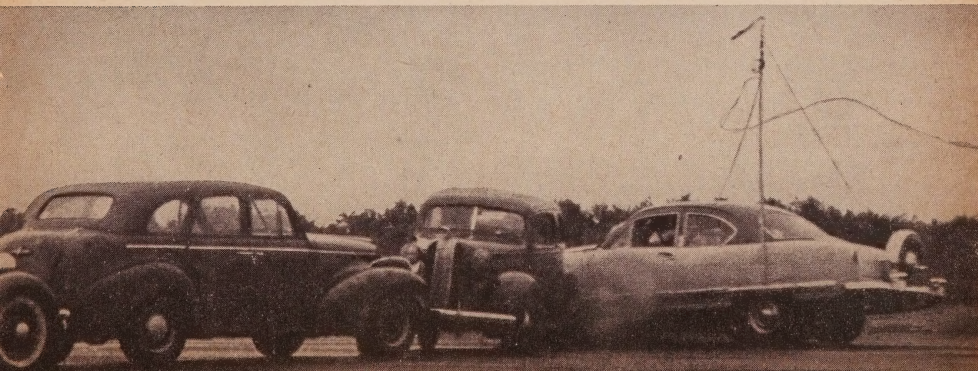
A group of old cars at one end of the runway was the "target." An engineer started the crash car, then the control car took over, guiding it like a dog on leash. A third sedan moved alongside the crash car, and the engineer transferred to it by an outrigger board. Then the unmanned car, with pilot car behind, sped down the runway and with a sickening crunch, whammed into the old cars amid flying pieces of steel and glass.

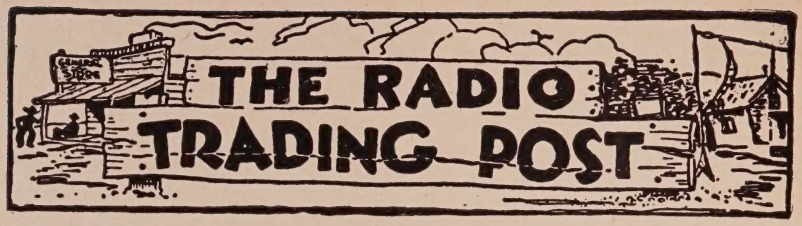
When the dust cleared, the crash car's front end was stove in, the "target" car was minus two front wheels and its side was caved in. Inside, the crash car was a shambles. The loose stuff on the ledge had scattered like shrapnel. The dummy had one knee pulverized and bumps to indicate hip fracture, dislocated shoulder, broken instep and back injuries. The movie camera was still grinding away to tell the engineers how to make cars safer.

Reprinted Courtesy "Popular Mechanics."

*Cornell-Dubilier Antenna Rotor Model TR-2

Cables flying after the pilot car cut loose, the shiny new car clipped rear bumper of one parked "target" and sent another (hidden behind it) spinning for nearly 40 feet from point of impact of mile-a-minute smashup.





This CORNELL-DUBILIER Advertising Service is FREE to "Capacitor" readers. If there is anything of general interest or appeal in the line of electronic equipment or service that you want to BUY — SELL — or SWAP . . . if you want a job or need help, these columns are at your service.

Please PRINT or TYPE your Ad clearly and limit it to 40 words including your name and address. Because of space limitations — only one Ad at a time -- please.

If you have a "CHANGE OF ADDRESS" — give both your OLD and NEW and mark your request "For C-D Capacitor Mailing List."

Ads are published in the order received and as space permits. If your Ad does not appear in one of the two issues following the month in which you submit your Ad — please RESUBMIT it.

CORNELL-DUBILIER ELECTRIC CORP. reserves the right to edit your Ad to conform to its policies and is the final judge of its suitability for publication. We do not assume any liability or responsibility for any transaction that results. Make your deal direct with the advertiser listed in the Ad.

FOR SALE — Precision sweep gen. E-400, never used, still in guarantee, $100; eighteen vols. Riders Trouble Shooter Guides, exc. cond. $80; 522 transmitter, no 832s $10. H. Gathercole, 45 Aberdeen Drive, Huntington, L. I., N. Y.

WANTED — Hallicrafters S-72 portable radio, 4-band, 540 Kc to 31 Mc. Must be in A-1 cond. Will pay cash. Chas. S. Brotzman, 173 Main St., Mexico, Me.

WANTED — PE103A dynamotor; 10 meter conv.; 2 meter transceiver circuits; .22 caliber, .410 over-under gun; 16 or 20 gauge shotgun. Jack Miller, 118 Southland, South Bend, Ind.

FOR SALE — BC-348 converted to 110 v. AC; BC-459 and power supply; Vibroplex key, 25 w. modulator. Also various small components. G. F. Richards, 8 Seattle St., Allston, Mass.

FOR SALE — Old Radiola IV model AR880, manufactured by GE for RCA, cabinet in fair cond., batteries dead. C. C. Reed ET1, U. S. Naval Station, A/U Weapons School, Key West, Fla.

SELL OR SWAP — 400 w. Phone-CW, 20-40-80 meters, fully metered, speech clipper. Want new TV, 21" VHF or 17" VHF-UHF. Pittsburgh area only. Howard F. Carson, Charleroi, Pa.

FOR SALE — QST 1942-1950, IRE 1945-1952; Electronics 1947-1952 and 6 months, 1953; Radio News 1929-1938; Complete Photography, 55 issues by Morgan; all good cond. Bremer Radio, 43 Washington Ave., Lake Hiawatha, N. J.

SWAP — 2000-1500 v., 400 ma.; 1500-1000 v., 350 ma. power supplies; KW modulation Xfmr or complete modulator, for test equip, woodworking equip. or low power xmtr. T. A. Coughlin, Box 82, Shore Acres, Mass.

FOR SALE — Hi-Fi system (Williamson amp. using Acro TO-300 output xformer, Collins FM-11 tuner, Kelton "Diplomat" spkr. system, custom built tone-control amp). A-1 cond., all $150. J. A. Mac Millan, 36 River St., Ballardvale, Mass.

FOR SALE — Emerson table model radio, plastic cabinet, $10; Philco table model radio with police band, $10; Emerson automatic radio phono combination, wood cabinet, $25. R. Laurora, 2546 Fenton Ave., Bronx 69, N. Y.

FOR SALE — Silver 906 AM-FM sig. gen., Silver 911 sweep gen. dual crystal markers; RCA lab type WV75A VTVM with diode probe; RCA 5" scope model 160B. Manuals included. Make offer. Lee Leighton, Box 85, Mohegan Lake, N. Y.

WANTED — An orig. GREENE receiver and/or GREENE Concert Selector radio manufactured about 1921-1925. Running cond. if possible, if not, good parts to assemble complete unit,must have panel and cabinet. Cash waiting. Lloyd C. Greene, Jr., 314 Washington St., Newton 58, Mass.

SELL OR TRADE — Complete Deforest's Training master course with all kits. Complete Radio Television Training Ass. course with all kits. Both in new cond. Test equipment, firearms, books in fine cond. accepted. C. Vaillancourt, Jr., Levis, P. Q., Canada.

FOR SALE — BC610E, factory converted for ten meter oper., TVI-proofed, complete with BC614 speech amp., all cables, six tuning units and casters. Looks like new. Best offer over $500. N. C. MacPhail, 1340 Giddings, SE, Grand Rapids, Mich.

WANTED — 2-station wireless intercom system. State make, cond., and price. Clyde W. Runnels, 736 Gregg St., Washington, C. H., Ohio.

FOR SALE — Sams folders 1 thru 38 in four binders, $20, FOB. R. and M. Television, 284 Morris Ave., Elizabeth, N. J.

FOR SALE — Riders manuals Vols. 2, 3, 4, 5. Joseph Abate, Box 392, San Carlos, Calif.

WANTED — 60H 260 ma. modulation reactor; UTC LS-series transformers; Chicago BD-1 and BM-1 transformers; Johnson 100ED45 and 100DD70 condensers; small VU or DB meters; 10 v. CT 10 amp. fil transformers. Cash or will trade other ham gear. J. E. Howell, Box 126, Lumberton, N. C.

FOR SALE — 85 Kc. IF's 7267, A-1, $1.50; Heath VTVM, V6, $30; TC 1P, $40; Eico 1040, $26; Triplett VOM 2400, $18; Raytheon VR6113, $5; NRI Service Course Text only. M. J. Marshall, 455 Washington Ave., Dumont, N. J.

TRADE — Jewell 199 Analyzer; Dayrad Output meter; other meters. Want firearms. W. S. Crooks, Box 409, Stow, Ohio.

FOR SALE — Hallicrafter SX25 receiver and speaker $50; Gas tube transformer, 115 v. pri., 12 Kv., 800 va., 120 ma., $35; ignition transformer, 115 v. pri., 10 Kv., 250 va., 23 ma., $15. P. A. Gobeille, 933 Lyman Ave., Oak Park, Ill.

FOR SALE — Used Western Electric 2-B rectifier, 220 v—3 ph—60 cyc.; Secondaries, —200 v.; high voltages, 1000-1150 DC, 2500-2900 DC, at 600 ma each; 10 v. AC at 31.5 amperes. Bias and high voltages separately fused and metered. Uses seven 249B or 866A rectifiers. Less tubes. Weighs 665 lbs., size 3'2" x 2'1" x 22". Best offer over $225, FOB Little Rock. W. Charles Webster, 21 Shannon Drive, Little Rock, Ark.

SELL OR SWAP — Philco and Airline 10" table model TV sets, need slight repair; 75 w. amp.; 10BP4 tube; homemade 2" scope, used tubes. Want photo equip. Omar Pritchett, 9714 Dodge Lane, Franklin Park, Ill.

FOR SALE — E.V. mike $30, mike mixer $7, two-speed GI turntable $8, Brush PL-20 pickup $10, velocity mike $10, new crystal disc cutter $5. V. Maycher, P.O. Box 485, Passaic, N. J.

WILL SWAP — Practically new Katolight power plant, 500 w. AC, for model 7008 Philco gen. Will pay difference. Sporna Radio Service, Escatawpa, Ala.

FOR SALE — Complete Riders vols. 1 thru 17, like new, $85; Vibroplex bug with case, A-1 cond., $12. Jim McCoy, Whitehall, Mont.

FOR SALE — Riders Vol. 7, 8, 10-18; Sams 1 to 90; condenser tester, C-D condensers, etc. Selling out service store. Fredric E. Broadhurst, 1031 Mulberry St., Wyandotte, Mich.

WILL TRADE — Tubes, radio parts, BC-312 (AC) and other surplus for .22 rifle, or stamps. Charles Remick, Route 1, Ellsworth, Me.

SELL OR TRADE — Hammarlund Super-pro model SP-10-X, 5 bands from 20.0 Mg. thru high fidelity broadcasting band, full door walnut cabinet. Hi-Fi speaker. Cheap or will trade for late model 15 HP Evinrude (Johnson) outboard motor. Charles Lieberman, 65 Fort Washington Ave., Apt. 63, New York 32, N. Y.

WANTED — Garrard model RC 60/D16 changer base only (wood or metal). State cond., price. George Spisak, 2426 N. Clark St., Chicago 14, Ill.

FOR SALE — Portable burglar alarm system 8½" x 12" x 14" for 110 v. outlet. Like new, $50. Weston 0-1 Ma. 4" meter DC, $10. Joseph Robinson, 1409 West Argyle, Chicago 40, Ill.

FOR SALE — NRI Service Manual, Vol. I, like new, $5 plus postage. Samuel L. Braucher, 42 Carlton St., Sodus, N. Y.

SWAP — McMurdo-Silver 805 Q5'er, with tubes, never used. Need an ohm-meter, such as Simpson 372, which cost same price new. S. Sutton, Box 369, St. Helena, Calif.

WANTED — Scott radio, any type and cond.; Rider manuals No. 16 up; 15" High Fidelity coaxial speaker; 12" to 17" TV set; used radio equipment; small band saw, drill press, jig saw, planer, woodworking machine. Enrique Cardona, G Z B-10, Puerto Nuevo, Puerto Rico.

SELL OR TRADE — Turntable 78 rpm automatic changer 10" or 12" with recording arm, in portable case. May need slight repair. Will trade for portable radio. Max Hoyt, 1762 Bath Ave., Brooklyn 14, N. Y.

FOR SALE — Weston model 695, type 11, power level, v., output, meter. 2 to 200 v. AC, minus 4 to plus 36 Db. Lists at $60. Best offer. H. Walther, 35 Montrose St., Newark 6, N. J.

TRADE OR SELL — Comprehensive exc. course Radio TV Institute. Want good sig. gen., sweep gen., or Riders TV manuals. M. Stockton, 67 - 82 Springfield Blvd., Bayside 64, L. I., N. Y.

FOR SALE — Complete AM-FM TV alignment setup; Precision E-200C, E-400 and ES-500A. Like new cond., little used. Save $140. G. E. Howarth, 216 1st Ave. E., Oskaloosa, Iowa.

FOR SALE — Used 7", 10", 12" TV sets, reasonable. Send for list. Edward C. King, Jr., 129 E. Marie St., Hicksville, L. I., N. Y.

FOR SALE — Like new PE-103 Dynamotor, 73CM $10; R89/ARN5A glide path rcvr. with crystals $25; A10-A sextant $10. All prices FOB. C. A. Brawner, 7207 Fisher Rd., Rt. 4, Dallas 14, Tex.

FOR SALE — Like new PE-103 Dynamotor, $15; low-wave, 80 and 40 meter aircraft rcvr., $10; 10" TV, good cond., $50; 24-hour clock, like new, $12. Frank Walker, 10015 Yale Ave., Chicago 28, Ill.

FOR SALE — Riders radio manuals Vols. 1 to 5. Excellent cond., $20 for all 5 or $5 each. Frank Neidhart, 527 West 135 St., New York 31, N. Y.

FOR SALE — Hammond Solovox, perf. cond., complete with instruction and service diagram. Also a Clavioline, like new. Both reasonable. Write for details. Herman Frankel, 1789 Bathgate Ave., Bronx, N. Y.

WANTED — Super-Pro (or equal) rcvr. and 20 meter beam rotator and dural tube for 3-element 20 meter beam in trade for Speed Graphic 2¼ x 3¼ with Kalart flash gun and carrying case. J. N. Cryer, Jr., Box 53, Natchitoches, La.

WANTED — Back issues of "Radio & Television News," "Radio-Electronics," and other radio technical magazines and IRE proceedings. Used copies of Terman's "Fundamentals of Radio," "Radio Engineers Handbook", and other radio texts. State edition. E. F. Coriell, 177 Pershing Ave., New Rochelle, N. Y.

FOR SALE — Latest Webcor wire recorder, model 288, perf. oper. cond., with mike, power cord, 3 spools of wire, removable take-up drum, instructions, complete $85. Cash and carry. Al's Radio and TV, 301 Marcy Ave., Brooklyn 11, N. Y.

WANTED — Pilot 3" TV set in any repairable cond., with or without tubes. Quote cond. and price in first letter. John H. Oxrieder, 510 Elm St., Bethesda, 14, Md.

FOR SALE — WE handsets, Silvertone 10 w. public address system complete, WE desk dial set, Ohmite 100 w. dummy antenna, Graflex 4 x 5 film pack adapter, Sonar XE-10, Underwood noiseless typewriter. G. Samkofsky, 527 Bedford Ave., Brooklyn 11, N. Y.

WANTED — Philco model 7008 or Simpson Genescope. Contact Hi-Video, Inc., Pearl River, N. Y.

WANTED — 7JP4 television picture tube, or will buy Motorola 7" receiver with a 7JP4 that works. Al Mauthe, 3600 Newport St., Denver 7, Colo.

SELL OR TRADE — Meissner model 8C FM tuner; BC-522 xmitter and receiver. Need 12LP4A and TV antenna rotator. R. D. McCartney, 1932 King Drive, Sharon, Pa.

FOR SALE — Unforeseen emergency, must sell all new gear. Johnson-Viking II transmitter with VFO both wired, latest Hammarlund MQ-140-X rcvr. with spkr. FOB N.Y.C. Joseph R. Lebo, 145 West 88 St., New York, 24, N. Y.

FOR SALE — Amateur call signs, quality aluminum, black enamel, white reflecting type letters, outlined in yellow, day or night visibility, weather tested. Satisfaction guaranteed. Regular 2" x 5" $1.50 or Jumbo 3½" x 12" $2, overnight service. Joe Whitley, 133 Airsdale Ave., Long Branch, N. J.

FOR SALE — Riders radio manuals 3, 4, 7-11, exc. cond.; Precision Vacuum Tube Multi-range Tester series EV-10. Best offer. Stuart R. Hyans, 1336 Kimberly Dr., Philadelphia 31, Pa.

SELL OR TRADE — Ameco Code Course (up to 18 words) with theory book $13.50; Instructograph, hand wound, tapes $9; Code oscillator, pitch and vol. control, 8" speaker, cabinet $10; Triplett, square case 0-10 MA, pilot light $4.50. M. M. Freedman, 144 - 34 72 Dr., Flushing 67, L. I., N. Y.

SELL OR SWAP — Weston 772 VOMA, Electro-voice 910 xtal mike, and juke box amp. with 15" speaker for Eico 360, 377, 495, 1050 or 315; also radio-TV books. A. V. Bragg, PO Box 1, Douglasville, Ga.

FOR SALE OR TRADE — NRI course, radio and record player comb., NRI multitester. Want good used Gonset converter for 80 m., prefer 80 thru 10. Criss Wayco, Box 362, Childersburg, Ala.

WANTED — Sept. '48 issue of Radio-Electronics. Will pay your price, or trade for like value. W4LAF, 460 North Limestone St., Lexington, Ky.

WANTED — BC-221 Freq. meter in good cond. for cash or will trade Sylvania model 131 3" scope, Millen Hi-Freq. transmitter, VHF 152A. Franklin M. Kern, 408 East Wynnewood Rd., Wynnewood, Pa.

FOR SALE — Large stock of sound and recording equip., much of it professional, some like new. Sacrifice for quick sale. Miller Electric Service, 925 N. Leeds, Kokomo, Ind.

FOR SALE — Superior TV10 tube tester, $30; Sprague Tel-Ohmike model 16, condenser resistor analyzer, $25. D. Tinnerello, 238 East 123 St., New York 35, N. Y.

WANTED — Projection tube for Philco 2500 receiver tube TP400 or TP400A. Donald E. Schaefer, 340 S. Virginia Ave., Burbank, Calif.

TRADE — Many items to trade for Heath test equip. B. Soroka, 5341 Cordelia Ave., Baltimore 15, Md.

FOR SALE — Sprayberry Radio-TV correspondence course, no kits, A-1 cond., $15; Drake solderpot model 100, 150 w., holds ½ pound solder, like new, with bar of solder, $3. Charles Bailey, 401 Denton Way, Santa Rosa, Calif.

WANTED — Electronic "Mon-Key" key monitor. State price and cond. J. P. Andrasko, 4404 Chestnut St., Phila., Pa.

FOR SALE — Riders manuals 1 thru 8, nice clean cond., cheap, or trade for woodworking tools or guns. Dick Miller, 1934 E. Broadway, Muskegon, Mich.

FOR SALE — 16 slightly used power xformers with leads at 85 ma. DC, 6.3 v. at 2.5A, 5 v. at 2A, 460 v., H.V., CT. Pri. with sec. on xformer 90 v., 110 v., 125 v., 150 v., 220 v. Make offer. Edward Talisse, 656 10th St., Brooklyn 15, N. Y.

FOR SALE — Hickok 288X sig. gen. in portable case, like new, $145; Hickok 538A tube tester and analyzer, $225, up-to-date. Capitol Radio, 101 N. Clinton St., Baltimore 24, Md.

FOR SALE — HRO-7 speaker, ABCD coils and power supply, exc. cond., $125. New York area. Thomas Putalik, 3141 Sedgwick Ave., New York 63, N. Y.

TRADE — Eico 5" scope model 425, used only a few times. Want Riders manuals. W. L. Criss, 248 Margaret St., Plattsburg, N. Y.

WANTED — R5/ARN7 or R5A/ARN7 radio compasses. Will pay good cash prices. Rudolph P. Fannon, 7607 Kittyhawk Ave., Los Angeles 45, Calif.

SELL OR SWAP — CREI Nilson's Master Course in Radio Communication (1951) 62 lessons and workbooks, for Precision E-200C sig. gen.; Pentron Audio Mix Electronic Mixer; 16 mm. sound film; 15 amp. Variac. George E. Marak, 323 South Scott St., New Carlisle, Ohio.

SELL OR SWAP — Solar model CF condenser checker; Eicor single speed tape recorder; model C-400 H.F. Craftsman Amp.; Turner, model TVI, TV or Electro Voice tenna top TV sig. booster. Need SX62 receiver. Milo Adamson, 4060 S. Penn, Englewood, Colo.

FOR SALE — National NC46 with speaker, $50; Heath tube checker, $25. James Cunningham, 25-34 - 44th St., L. I. 3, N. Y.

FOR SALE — RME 45 receiver, exc. cond., with speaker, $100. Free delivery in New England, otherwise FOB. D. L. Gearing, 25 Delmar Ave., Farmingham, Mass.

FOR SALE — Riders 1-3, 8, 11-14, good cond., $50; Meissner Analyst, good cond., $60. Substitute speaker and field, $15. G. H. Cook, Jr., 1001 Carpenter St., Brunswick, Ga.

WANTED — Modulation Transformer 125-250 w., Universal. Gus M. Mondrush, 600 Beechmont Dr., Dearborn, Mich.

FOR SALE — Comm. receiver, BC-312, unmodified, 1.5 to 18 meg., in working cond., 12 v. DC. Best offer. James I. Leabman, 154 Oxford Circle, Norristown, Pa.

SELL OR SWAP — FM tuner, Howard or Edwards, in orig. cabinet, $22; Cinaudagraph 12" speaker, $7; Leica III, C f2, never used, $185; GE foot candle meter, $10, or swap for VOM. S. Swetzoff, 149 Intervale St., Boston 21, Mass.

FOR SALE — DeForest 2" scope $40, sig. gen. $15, and volt, ohm, milliameter $15. Separate or all for $60. Melvin Saur, Kent City, Mich.

WILL SELL — ATR type 110A Inverter, 110 DC to 110 AC at 325 w. RCP VTVM model 424A. Both in good cond. V. A. Virliano, 70-80 Kenmore St., New York 12, N. Y.

SELL OR SWAP — Two commercial TV sets with 15" picture tubes, both in good cond. Want test equip. or cash. C. F. Scorso, 593 Western Ave., Lynn, Mass.

FOR SALE — Heath 0-6 scope, Eico VTVM 221, approved sig. gen. A-200. $50 takes all three. Joseph Cohen, 1006 Gerard Ave., Bronx 52, N. Y.

SELL OR TRADE — 7" TV set in good working cond., for $25, or trade for camera. E. Vockerath, 1746 N. Campbell Ave., Chicago 47, Ill.

WANTED — Heathkit condenser checker, model C-2 (assembled or not) $15. Will pay parcel post. Walter Saeger, 65 Oakwood Ave., W. View, Pittsburgh 29, Pa.

SELL OR SWAP — Like new National NC-57, Retina 35 mm., II A f3.5, equal to new, case, acc. Best offer or ?? E. Schmitka, 1481 Shakespeare, New York 52, N. Y.

FOR SALE — RCA R-A-K-7 long wave receiver, freq. range 15-600 kc. in six bands, complete with 115 VAC 60 v. power supply, used less than 8 hours, $65. H. Sparrell, High St., Holliston, Mass.

WANTED — New reels red oxide mag. tape, name brands. Swap or sell Carl Zeiss 8 x 30 Deltrintem Binocs $60, RCP model 705A sig. gen. $30, Schauer battery charger 6 v. at 4 amp. (circuit breaker model) $10. P. Kacoure, 148-09 Jamaica Ave., Jamaica 35, N. Y.

SELL OR TRADE — Supreme radio diagrams, 1926 to 1952, 12 books in all. Misc. Sams folders. G. H. Swiska, 109 East School St., Woonsocket, R. I.

SELL OR TRADE — 78 rpm operatic, electric and accoustic records in exc. cond. (Caruso, Tetrazzina, Bori, etc.) Sam Block, 646 Argyle Road, Brooklyn 30, N. Y.

POSITION WANTED — Opportunity in radio-TV; partnership or ? Have no money but graduate of two radio-TV schools. In business for past year. Have truck, equip., parts. 28 years, go anywhere. Make offer. C. S. Wood, South Berwick, Me.

WANTED — Photos, schematics on Heathkit, Williamson amp. kit model W-2. V. E. Beck, 7007 North 33 St., Omaha 12, Neb.

WANTED — Good Vibroplex or Mon-key. Have various ham items to trade, send for list. H. Wax, 264 Division Ave., Brooklyn, N. Y.

WANTED — TV technician with car, part time. Paragon TV and Radio Service, 170-26 Jamaica Ave., Jamaica 3, L. I.

FOR SALE — Precision VTVM model EV-10A, Precision sig. gen. model E-200-C, Precision tube and set tester model 654, Precision Electronics sig. tracer model 251, 6 v. Stancor power supply. R. D. Briggs, 235 Bolard Ave., Cambridge Springs, Pa.

WANTED — Operating instructions for Solar Capacitor Analyzer, model CE, serial number E-5143. Joseph H. Patalick, 542 East 109 St., Cleveland 8, Ohio.

FOR SALE — Hickok AC 51X dynamic tube and radio set tester; Hickok 510X tube and set tester. Best offer. Bud's Radio and Television Service, 5912 Hampton Ave., St. Louis, Mo.

WANTED — Coils (RF and osc.) for all bands, for NC-100. State price, cond., and whether mounted in coil box. Stephen O. Kucera, 2105 McElderry St., Baltimore 5, Md.

WANTED — FM receiver, 30-50 mc. Give lowest price or trade. Joseph M. Malak, Center Road, Chesterland, Ohio.

WANTED — Cabinet for Zenith table model radio 6D510, any color. M. J. Lacharite, 12 Seymour Road, Berlin, Conn.

SWAP — Model 130 Triumph sig. gen. for good used dynamotor, capable of 40 to 60 w. input, 6 v. in, 400 to 600 v. at least 100 ma. out. F. E. Shanks, 810 Calle Margerita, Tuscon, Ariz.

FOR SALE OR TRADE — Sprague Tel-Ohmike condenser resistor tester good cond.; Sprayberry Radio course, complete with parts for experiments. E. J. Kostelnak, 5033 So. Seeley Ave., Chicago 9, Ill.

SELL OR TRADE — Power supplies, phono parts, mobile equip. Want National NC-125 comm. receiver. R. H. Milburn, 1730 Pine St., Philadelphia 3, Pa.

FOR SALE — GE auto radio, 230 with foot control station selector $20 COD; also two used 250 TH tubes to sell or trade. Joseph Lucca, 221-37 113 Drive, Queens Village 29, N. Y.

WANTED — Riders TV manuals 8 thru 11. Sell 7" TV, ideal for field strength meter. Also larger TV. Charles E. Spitz, 1420 South Randolph St., Arlington 4, Va.

WANTED — Tube tester in good working order, also want a receiver for 30-50 mc. or 152-174 mc. John P. McCullen, 3050 Bainbridge Ave., Bronx 67, N. Y.

SELL OR TRADE — EMC 106, VTVM, Oakride 103 syncro sweep and 104 TV sweep FM gen., like new. Want Sprayberry TV course with all books, manuals and TV kit. C. de Grijze, 25 Bogart St., Brooklyn 6, N. Y.

SELL OR TRADE — Riders 10 thru 19, $100 or ? Luther Hoffman, 678 Princeton Ave., Palmerton, Pa.

FOR SALE — GE AM-FM sig. gen. YGS-3, $60; GE 3" scope $25; GE Capacitance-Resistance Bridge $20; Triplett pocket VOM 666H $12, all like new; Meissner Analyst $30. Seymour Tenzer, 138 Dahill Rd., Brooklyn 18, N. Y.

WANTED — German war souvenirs: decorations, knives, guns, clothes, etc. Will trade radio gear, big pre-amp, double-barrel shotgun (10G in fair cond.), or cash. Lloyd Schmidt, R. 1, Brunnerdale Seminary, Canton, Ohio.

SWAP — 12½" Zenith TV console with doors, very good cond., for Precision series 10-12P Electronamic Tube Master (checker) and series EV-20 VTVM or its equivalent. New York area only. John C. Perino, 3225 Olinville Ave., Bronx 67, N. Y.

FOR SALE — Clarkstan 213 pick-up arm and needle gauge, Astatic F.L.C. pick-up arm, two diamond stylus crystal cartridges, Shure 710 crystal mike, etc. J. Holloway, 1421 Arch St., Philadelphia 2, Pa.

FOR SALE — BC-454B receiver 3 to 6 mc., noise limiter and BFO added; BC-229 receiver 201 to 398 and 2500 to 7700 kc., both exc. cond.; Coyne applied practical radio, 5BKS, complete, make offer. Lester Brunner, Jr., Route 5, Box 729, Oregon City, Ore.

FOR SALE OR TRADE — Clough-Brengle OM-A sig. gen., and CRA Oscillograph complete with instructions; Weston 772 VOM; Precision AV-10 VTVM with probe; Comet Pro receiver. T. Glenn Watt, 415 W. First St., Chanute, Kan.

SWAP — Philco model 48-1000 10" TV for good comm. receiver with preference to NC 57, NC 125, SX 71, HQ 129x, or Gonset 2 meter communicator. Howard Haftel, 1651 Montgomery Ave., Bronx 53, N. Y.

FOR SALE — Model 625 Eico tube tester, $38; Eico model 621 VTVM, $33, both used very little. Richard Wrobel, 175 23rd St., Barberton, Ohio.

WANTED — Blank calibration book for BC-221 freq. meter, also crystal for BC-221. C. F. Crandell, 3015 Ivandell Ave., Dallas 11, Tex.

SWAP — 2 meter converter complete with tubes OB2, 6AK5, two AG5, Two 12AT7 for BC-454 or BC-455, unconverted, complete with tubes and in good cond. Horace C. Dolph, 1755 Madison Ave. SE, Grand Rapids, Mich.

WANTED — Hallicrafter S53A or S40B receiver. Charles Stouth, Secane, Pa.

SELL OR SWAP — Riders $5 each; Heath 0-8 scope, 3 mos. old, $45; Heath tube tester TCI circuit for ohm and volt meter readings, case, $25; unused Westinghouse time elapse meter, $10. Want Zeiss Binocs., 8 or 10 power. Leitch TV Service, 34 Park Drive South, West Orange, N. J.

FOR SALE — GE portable (battery AC-DC) Superhet radio receiver, model LB612, good cond., complete with tubes, less batteries. Cash only, prefer local transaction. G. M. Costes, 1308 Powell St., San Francisco 11, Calif.

FOR SALE — Hallicrafter Super Skyrider model S-9, 5 bands, with crystal. Perf. cond., send collect $30. R. Garcia, 300 West 17th St., New York 11, N. Y.

FOR SALE — Books: FM Simplified, and TV Simplified, Kiver; TV Handbook and Radio Handbook, Boyce Roche; BD Dynamotor 12 v. input, 1000 v., 350 ma. output. Watchmaker's bench, complete with tools, material, etc., $260. Want comm. receiver. R. J. McComb, 111-46 134 St., South Ozone Park, L. I. 20, N. Y.

FOR SALE — Complete set of Rider Vols. 1 to 14 inclusive, exc. cond., reasonable. Werner's, 20 Court St., Binghamton, N. Y.

SWAP — 2 TV-UHF Motorola converters, blonde, model TC-101 for small comm. receiver. C. I. Cook, 124 Chestnut St., Medina, N. Y.

SWAP — Tubes: types 01A, 26, 27, 39-44, 56, 76, 6J7, 6L7, 6SK7, 12SK7, and record changer from Capehart Panoramic. Want 10" TV chassis, tubes, or what have you. Fred Levitt, 119-53 230th St., Cambria Heights, N. Y.

SELL — Collins 32RA7 150 w. phone CW xmtr, needs work; Hallicrafters S40; transmitting tubes; Masco amplifier and speakers. John V. Urban, 140-34 Holly Ave., Flushing, N. Y.

FOR SALE — Model 288X Hickok universal crystal controlled sig. gen., Type 274 Dumont cathode-ray oscillograph, Model 610ELIB ART rectifier power supply, all in perf. cond.; combination tube checker, volt-ohm-milliameter, model 802, used; Riders manuals vols. 8-15. Total price, $200. Costy Andrunas, 254 W. Grand St., Elizabeth, N. J.

SWAP — Periodic phone patch privileges in Chicago or northern suburbs for similar privileges in San Diego or Los Angeles, where I have junior ops. Can operate on 10, 20, or 40. R. W. Carter, 1002 N. Beverley Lane, Arlington Heights, Ill.

FOR SALE — VOM Precision series 85, 20,000 ohms per volt, Ranges 0-6000 v., 0-12 amps., 0-60 megohms. Like new cond. Paul Oppenheimer, 10 Stuyvesant Oval, New York 9, N. Y.

FOR SALE — 5" Eico scope model 425, no case; Eico sweep gen., model 360, no case, very reasonable. Ernest R. Minott, 325 East 143rd St., New York 51, N. Y.

FOR SALE — Ampex, model 400 tape recorder, almost new, and in perf. cond. Rev. Philip R. LiCalzi, Greenwich, N. J.

FOR SALE — Philco battery operated sig. gen.; Weston 0-1 amp. RF Ammeter; Triplett 0-1 mill. DC Milliameter. M. G. Weiman, 4514 Ave. K, Brooklyn, N. Y.

WANTED — Late model Heathkit scope and other test equip. Must be in good cond. and reasonable. I. J. Rohssler, 224 York St., Brooklyn 1, N. Y.

FOR SALE — Alliance tenna rotor, model D1R, 15 feet mast, house bracket, workshop di-pole, modulator-transmitter, etc. Don Guptill, 17 Park St. Ct., Medford, Mass.

FOR SALE — Precision EV-10 VTVM with case, also Precision E-200-C sig. gen., both like new $95. George Genrich, Elmwood 10, Conn.

FOR SALE — AN/PRS-1 mine detector, $50; British mine detector, WA10101, $40; 10 w. Hi-Fi amp. and power supply $20. Prices FOB. R. H. Pickard, 2417 Taylor Ave., Alexandria, Va.

FOR SALE — Heath sig. gen., $20; used guitar amp. and mike., $25; Motorola portable radio $15; 10.7 mc. IF transformers, 75c each. Walter Smith, R. 2, Carlisle Highway, Charlotte, Mich.

WANTED — Bug, good cond., for high school student. Call CRanford 6-4547, or write Clayton Luce, 18 West Holly St., Cranford, N. J.

WANTED — Model T Ford spark coil. Will either purchase, or swap radio receiving tubes and other items. Edward Lind, 686 Georgia Ave., Brooklyn 7, N. Y.

SELL OR SWAP — 35 w. Bogen sound system complete for late model tape recorder. Send self addressed stamped envelope for details. Hoffman Sound Systems, 18 Case St., Mt. Morris, N. Y.

FOR SALE — Perf. RCP tester, model 488A, 20,000 ohms per volt, portable tester with warranty card, $35. John F. Bacinski, Route 3, 18479 Kesh Rd., Birmingham, Mich.

SWAP — Unused BC-645 transmitter-rcvr., 435-500 mc., less dynamotor with civ. band conversion data. Want scope, tube checker, or what have you? Mel Yohman, 11901 Buckingham Ave., Cleveland 20, Ohio.

SWAP — Like new 1951 Chevrolet auto radio; unused L. C. Smith typewriter, desk model. Want good camera, TV, or what have you. M. Gianfrocco, 1 Bell St., Providence 9, R. I.

FOR SALE — Electro voice aristocrat enclosure with SP-12 speaker, $99; Heathkit sig. tracer, $17.50; Custom Ultra-Linear Williamson two chassis amp. using UTC-LS-57 transformer and 807's, $75. Howard Jones, 52 N. Quentin Ave., Dayton 3, Ohio.

FOR SALE — 1948 panel delivery truck and Sams Photo Facts. C. W. Ashley, 1304 Belmont St. NW, Washington 9, D. C.

SELL OR TRADE — Like new Concertone 1401 tape recorder, in 501 carrying case with monitor amp. and loudspeaker. Cost $427.50. Cash or trade for used disc recording mechanism such as Presto 6N. C. E. Parker, 830B Crossway Road, Burlingame, Calif.

SELL OR SWAP — TV books: Television Simplified by Milton S. Kiver, $4; Servicing Television Receivers by Philco, $1.50. Both in fine cond. RCP multitester model 446, exc. cond., $10. Best offer in tubes or sell for cash. Lowe E. Smith, Route 1, Silver Creek, Ga.

FOR SALE — cheap: Two prop. pitch motor ant. rotators, 30 v. transformer, 2 selsyns with fibre gear to motor; SX-62 receiver, with R-46 speakers, $250. L. W. Van Slyck, Route 6, Box 575, Tampa 4, Fla.

WANTED — Tape recorder, disc recorder, V U meter, audio parts for a child's amp., 19" rack floor model, radio station transcriptions, meter jacks, amphenol connectors. M. White, 228 S. Penn Ave., Minneapolis, Minn.

SELLING OUT — Test equip., radio parts, tubes, tools, etc. Write for list. Maurice Superville, 6501 Minola St., Houston 7, Tex.

FOR SALE — HT-9 Transmitter, perf. cond., Coils 40 and 20, spare 814, instruction manual, gray crackle, untampered, $195 FOB. N. C. Kellerman, 5 Sandrock Rd., Buffalo 7, N. Y.

FOR SALE — Used Rider manuals 1 thru 20 with index, $100; used GE sig. gen., model YGS-3, $50 FOB. Johnson Radio, 304 Oakwood St., Austin, Minn.

FOR SALE — Elmac A54H mobile xmitter, Viking 1 w/viking VFO, S53 or SW54 receiver and CQ mags., '47 thru '50, minus 4 issues. Ralph Netzley, Ogden and Sleight, Naperville, Ill.

FOR SALE — Eico model 315 sig. gen., exc. cond., plus connecting cords and operating data, $28. S. Kieser, 49 Woodfield Rd., Westwood, N. J.

SWAP — GE AM-FM radio model 408 as is for shortwave set getting police calls or tube tester or what have you. George G. Moll, Sr., 1118 Music St., New Orleans, La.

SELL OR TRADE — Precision 912 tube checker, EV-20 VTVM, RCA 107B test oscillator, Dumont 224-A scope, Eico VTVM, 115 v. DC power supply for RCA 8027. Want 12 gauge shotgun, BC-221 in perfect cond. Southampton Electronic Service, Southampton, N. Y.

SWAP — Camera, 6½" x 8½", triple convertible lens, three plate holders. Want Hi-Fi components, speakers, or recorder in repairable cond. Denver F. Moffett, 107 Quincy St., Clarksburg, W. Va.

SELL OR SWAP — Dralowid - Projektor (German made) in running cond., Bergen Drawing set 312, Pilotuner for frequency modulation, Two 211 tubes. Want automatic code machine (used) and tapes. Will sell individually. Rev. H. Francis Berkshire, 304 E. Pearl St., Lenark, Ill.

FOR SALE — Presto disc recorder, complete with mike., 4 years old, A-1 cond. Price reasonable. Sheldon T. Gardner, 7625 N. Greenview, Chicago 26, Ill.

GOING MOBILE? Wanna swap an 810 or 813 for a PE-101 dynamotor (converted)? Byron E. Fortner, Route 6, Box 370, Indianapolis 27, Ind.

WANTED — TV cabinet only for Crosley TA307 with "630" chassis. Robert N. Weis, 14600 Elm Ave., E. Cleveland 12, Ohio.

FOR SALE — Elmac A54H 50 w. transmitter 80, 40, 20, 11, 10, $125; power supply 500 v. at 250 ma., 6.3 v. at 6A, $40; Ant. coupler, with ant. relay, coils, etc., $12; model 600D mike (push to talk), $18. Sell all for $185. Leon Berandt, 621½ Brooks St., Ann Arbor, Mich.

SELL OR SWAP — Zenith transoceanic portable, perf. cond., cash or late model portable typewriter. J. J. Cermak, 542 Woodside, Hinsdale, Ill.

FOR SALE — Hickok model 288X crystal controlled sig. gen.; AM, FM, AF, sweep gen.; Output meter; Audio oscillator, like new. Herbert Evander, 194 Denver Rd., Paramus, N. J.

WANTED — Cabinet for Zenith radio model 5R312; also oscillator coil part no. 9PT-6209 for Emerson table model radio, no model number. Allison's Radio Service, 720 Locust St., Indiana, Pa.

WANTED — WE-728B speakers, New York Philadelphia area, will inspect personally. J. M. Gottshalk, 5813 Thomas Ave., Philadelphia 43, Pa.

SELL OR SWAP — Outside Admiral sign 3' x 5', battery eliminator, service diagrams, radio books, tubes, other radio materials. Write for list. Sutherland Electric, Box 27, Romulus, N. Y.

SELL OR SWAP — Model 100 Electronic Mfg. Co. VTVM, all probes; Triplett Mod. 226 panel meters 0-5 amp. DC, 0-3 amp. AC, 0-10 amp. AC, 0-150 v. AC; Triplett Mod. 521 multimeter, all exc. cond., for cash, camera or ? P. M. Ohlinger, Portsmouth, Iowa.

FOR SALE — 75 assorted tubes, $37.50; Supreme model 561 sig. gen., $50; Supreme 562 Audolyzer, $50; Supreme 644 multimeter, $60; Riders manuals 7 and 12, $30, vols. 1, 2, and 3 combined, $25. All in good cond., FOB. Thomas F. Wilson, 511 First Ave., Savannah, Ga.

SELL OR SWAP — Westinghouse Rectigon battery charger, Vasco 100 w. soldering iron, Stevens 25 cal. target rifle, antique; auto radio. Need Craftsman tuner, mobile receiver, test equip. C. E. Junkins, Jr., RFD 1, Box 272, Holyoke, Mass.

FOR SALE — Riders TV manuals, 1 thru 9, Chicago area preferred, value $207.56, yours for best offer. Need Riders Vol 15 radio manual. Louis Sciez, 1864 Welwyn Ave., Des Plaines, Ill.

FOR SALE — Schmidt lens system complete with 5TP1 tube and 20 KV power supply. Large cabinet and experimental TV receiver thrown in. Pick-up in local area only. A. F. Toth, 38 Park Row, New York 7, N. Y.

FOR SALE — Hammerlund 4-20 transmitter, like new, $40; Photographic gram scales, $5. Lawrence Owens, 312 Shorter Ave., Attalla, Ala.

WANTED — Sams Photofact Folder Sets. State price and cond. F. Dunlap, 6380 Devonshire, St. Louis 9, Mo.

WANTED FOR CASH — Sams Photofact folders 71 thru 80 and 120 to 230. All folders should be complete, state if in binders, cond., and price. Earl W. Wells, 223 N. Phila., Shawnee, Okla.

SELL OR SWAP — Cardwell CE26 sound reproducer, BC375E. In original cartons. Want used comm. receiver or test equip. J. Melescinsky, 12 Woodland St., Plainville, Conn.

WANTED — Used radio testing equip. and radio course. Wesley Kay, 3397 Kingsway, Vancouver, B. C., Canada.

FOR SALE — Standard Teleplex code instructor, spring motor, ten tapes (20 lessons) and instruction book, $10. L. Hague, 2804 - 33rd Ave., Long Island City 6, N. Y.

FOR SALE — Mine detector SCR625, like new, with case and batteries, $32.50, FOB. R. P. Golladay, 2515 N. Washington Blvd., Arlington 1, Va.

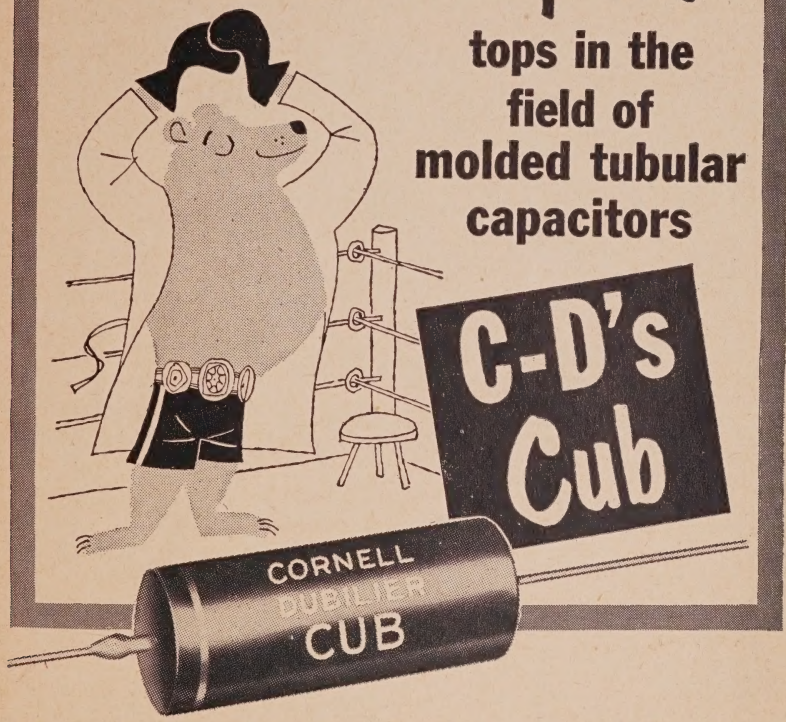
FOR SALE — Premier AM sig. gen., model 570, fundamentals to 50 mc., harmonics to 150 mc. on calibrated scale. Prefer local sale. Theodore Popel, 1223 Elm Ave., Brooklyn 30, N. Y.

FOR SALE — Riders manuals 1-5 abridged, 6-13, very reasonable; have many technical books, send for list. Samuel A. Gornick, 1150 No. LaSalle St., Chicago 10, Ill.

FOR SALE — Hickok 288-X sig. gen. and Hickok 195 scope. Used only a few hours, $150 takes both. Zimmer Radio and TV, 55 Canisteo St., Hornell, N. Y.

A New Champion!

tops in the field of molded tubular capacitors



* Outperforms all other molded tubulars in humidity tests!
* Stands up under temperatures up to 100°C.
* You get more for your dollar with this premium tubular designed and built especially for replacement needs, with "better-than-the-original" performance!
* Ask your C-D jobber about the special "Cub-Kit"!

* * * *

For the name of your C-D distributor, see the yellow pages of your classified phone book. Write for Catalog to: Dept. CAP, Cornell-Dubilier Electric Corp., South Plainfield, N. J.

CONSISTENTLY DEPENDABLE

CORNELL-DUBILIER

There are more C-D capacitors in use today than any other make.

PLANTS IN SOUTH PLAINFIELD, NEW JERSEY; NEW BEDFORD, WORCESTER AND CAMBRIDGE, MASSACHUSETTS; PROVIDENCE AND HOPE VALLEY, RHODE ISLAND; INDIANAPOLIS, INDIANA; SANFORD AND FUQUAY SPRINGS, NORTH CAROLINA. SUBSIDIARY RADIART CORPORATION, CLEVELAND, OHIO

No Searching

with C-D's line of "UP" electrolytics

. . . simplifies your TV replacement problems

- The only twist-prong electrolytic line with *complete* replacement coverage!
- Saves you hours of "hunting time".
- Follow the C-D TV Guide, and you automatically meet and beat the manufacturer's requirements for every TV set.
- See your local C-D jobber today (he's in your local Classified Phone Directory) for C-D's Television Replacement Guide TVR 7A or write to Dept. CAP, Cornell-Dubilier Electric Corp., South Plainfield, N. J.

CONSISTENTLY DEPENDABLE

CORNELL-DUBILIER CAPACITORS

SUBSIDIARY

Plants in South Plainfield, N. J.; New Bedford, Worcester and Cambridge, Mass.; Providence and Hope Valley, R. I.; Indianapolis, Ind.; Sanford and Fuquay Springs, N. C.; and subsidiary, The Radiart Corp., Cleveland, Ohio.

Printed in U. S. A.